



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,783	04/21/2006	Makoto Katayama	MAT-8842US	5881
53473	7590	04/29/2011		
RATNERPRESTIA			EXAMINER	
P.O. BOX 980			BAYOU, AMENE SETEGNE	
VALLEY FORGE, PA 19482				
			ART UNIT	PAPER NUMBER
			3746	
			MAIL DATE	DELIVERY MODE
			04/29/2011 PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/576,783

Applicant(s)

KATAYAMA ET AL.

Examiner

AMENE S. BAYOU

Art Unit

3746

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2011 (RCE).
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-946)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 03/16/11
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Applicant's submission filed on 03/16/11 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. In re claim 2, line 2-3 recites "the parallel line" which lacks antecedent basis. For purpose of examination examiner interpreted the phrase as "a parallel line".

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 3746

6. Claims 1-3, 6-15 are rejected under 35 U.S.C 103(a) as being unpatentable over Katayama (Japanese patent publication number 2003065236) in view of Osborne (2407440) further in view of Wantanabe (5076226).

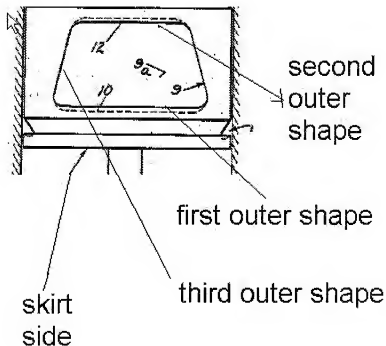
In re claims 1, 6, 8, 11 and 12 Katayama discloses a compression system including:

A **hermetic compressor (figure 1)** storing **oil (see abstract)** in a hermetic container and accommodating a compression mechanism for compressing refrigerant gas, wherein the compression mechanism comprises: a crank shaft disposed in vertical direction, and having a **main shaft (9)** and an **eccentric shaft (10)** ,a block forming a **cylinder (13)** ,a **piston (23a)** making a reciprocating motion in the **cylinder (13)** , and having a top surface and a skirt surface, both vertical to a direction of the reciprocating motion, a **connecting rod (11)** for coupling the **eccentric shaft (10)** and the **piston (23)** , and an **oil supply system (7c)** for supplying the oil to an outer circumference of the piston (**see abstract**) , **grooves (23e)** are provided at an upper side and a lower side of the outer circumference of the piston, and an outer shape of the grooves communicating with a space in the hermetic container at least when the piston is in a bottom dead center is a shape not forming a parallel line to an axial center of the piston when the grooves are developed in a plane (**clearly shown in figure 5 and discussed in abstract**).

Katayama fails to disclose closed semi circular shaped groove including further details of the groove.

Art Unit: 3746

Osborne teaches an oil lubrication system for pistons including **closed groove (formed by 9,10,12;figure 2 and see below) outer shape of the grooves** extending toward a **skirt side** of the **piston (6)** , and the shape of the groove includes a **first outer shape** (see below) extending toward the skirt side of the piston, a **second outer shape** parallel to the top surface of the piston , and a **third outer shape** linking the first outer shape and the second outer shape, and a curvature of the first outer shape is smaller than that of the third outer shape.



Watanabe et al teach lubrication oil grooves for pistons in which the **outer shape of the grooves (28 and 328; figure 2, 4, and 9) is a semicircular shape (column 3, lines 5-9; column 4, lines 6-18).**

It would have been obvious to one skilled in the art at the time the invention was made to modify the piston grooves of Katayama by making them

Art Unit: 3746

as closed recesses (as opposed to open ended) as taught by Osborne because the closed grooves serve as oil reservoir or pocket and enhance lubrication (described by Osborne in column 2, lines 26-35).

It would have also been obvious to one skilled in the art at the time the invention was made to have made the modified grooves of Katayama in semicircular fashion because the curved shape provides facilitated oil flow and increased area of lubrication. Please note that once modified the grooves of Katayama implicitly communicate with the space in the hermetic compressor.

In re claim 2 Katayama in view of Osborne further in view of Watanabe et al as applied to claim 1 discloses the claimed invention:

Katayama discloses:

All of the outer shapes of the grooves (23e) are shapes not forming a parallel line to the axial center of the piston when the grooves are developed in a plane, in figure 5.

Osborne discloses:

All of the outer shapes of the grooves (9, 10, and 12) are shapes not forming a parallel line to the axial center of the piston when the grooves are developed in a plane

In re claim 3 Katayama in view of Osborne further in view of Watanabe et al as applied to claim 1 disclosed the claimed invention except the extent of the groove depth.

It would have been obvious to one skill in the art at the time the invention was made to choose the proper groove depth since such value merely depends on the size of the compressor, the degree of lubrication required and the flow rate of the lubricant that the designer chooses.

In re claims 6 and 10 Katayama in view of Osborne further in view of Watanabe et al discloses the claimed invention:

Katayama discloses:

A hermetic compressor, in figure 1, storing oil in a hermetic container and accommodating a compression mechanism for compressing refrigerant gas, wherein the compression mechanism comprises: a crank shaft disposed in vertical direction, and having a main shaft (9) and an eccentric shaft (10), a block forming a cylinder, a piston (23a) making a reciprocating motion in the cylinder (13), and having a top surface and a skirt surface, both vertical to a direction of the reciprocating motion, a connecting rod (11) for coupling the eccentric shaft (10) and the piston (23), and an oil supply system (7c) for supplying the oil to an outer circumference of the piston (see abstract), grooves (23e) are provided at an upper side and a lower side of the outer circumference of the piston, wherein a through-hole is disposed at about the center of the grooves (figure 5).

Osborne teaches:

Art Unit: 3746

Closed grooves (formed by 9,10,12;figure 2) ,the grooves include a **first groove portion** (see above) extending toward a skirt side of the piston, and a **second groove** portion extending toward a top side of the piston,

Watanabe et al teach:

The **grooves having a semicircular shape (column 3, lines 5-9; column 4, lines 6-18)**. Please note that once modified the grooves of Katayama communicate with the space in the hermetic compressor.

In re claims 7 and 9 Katayama in view of Osborne further in view of Watanabe et al discloses the claimed invention since as clearly shown in the annotated drawing above the outer shape of Osborne's groove including the first outer shape, the second outer shape and the third outer shape is a curved shape to be gradually increase in sliding width toward the skirt direction of the piston.

In re claim 8 Katayama in view of Osborne further in view of Watanabe et al discloses the claimed invention since Katayama in **figure 5** discloses a **through-hole** is disposed at about the center of the grooves.

In re claim 11 Katayama in view of Osborne further in view of Watanabe et al discloses the claimed invention:

Katayama discloses:

Art Unit: 3746

A hermetic compressor (**figure 1**), storing oil in a hermetic container and accommodating a compression mechanism for compressing refrigerant gas, wherein the compression mechanism comprises: a crank shaft disposed in vertical direction, and having a **main shaft (9)** and an **eccentric shaft (10)** , a block forming a cylinder ,a **piston (23a)** making a reciprocating motion in the **cylinder (13)** , and having i)a top surface and a skirt surface, both vertical to a direction of the reciprocating motion and II) a through hole , a **connecting rod (11)** for coupling the **eccentric shaft (10)** and the **piston (23)** , and an **oil supply system (7c)** for supplying the oil to an outer circumference of the piston (see abstract) ,**grooves (23e)** are provided at an upper side (or a lower side) of the outer circumference of the piston

Osborne teaches:

Contiguous groove (formed by 9,10,12;figure 2) outer shape of the grooves extending toward a **skirt side** of the **piston (6)** , and the shape of the groove includes a **first outer shape** (see above) extending toward the skirt side of the piston, a **second outer shape** parallel to the top surface of the piston , and a **third outer shape** linking the first outer shape and the second outer shape, and a curvature of the first outer shape is smaller than that of the third outer shape, the outer shape of the first groove portion is curved, all of the outer shape of the grooves (9,10,12) are shapes not forming a parallel line to the axial center of the piston when the grooves are developed in a plane

Art Unit: 3746

Watanabe et al teach:

The **grooves having a semicircular shape (column 3, lines 5-9; column 4, lines 6-18)**. Please note that once modified the grooves of Katayama communicate with the space in the hermetic compressor.

Please also note that since the grooves Watanabe et al are in a circular or semicircular fashion once modified the grooves will encompass (encircle) the through hole of Katayama.

In re claim 12 Katayama in view of Osborne further in view of Watanabe et al disclose the claimed invention:

Katayama discloses:

A hermetic compressor ,in figure 1, storing oil in a hermetic container and accommodating a compression mechanism for compressing refrigerant gas, wherein the compression mechanism comprises: a crank shaft disposed in vertical direction, and having a main shaft (9) and an eccentric shaft (10) ,a block forming a cylinder ,a piston (23a) making a reciprocating motion in the cylinder (13) , and having a top surface and a skirt surface, both vertical to a direction of the reciprocating motion, a connecting rod (11) for coupling the eccentric shaft (10) and the piston (23), and an oil supply system (7c) for supplying the oil to an outer circumference of the piston (see abstract), grooves (23e) are provided at an upper side (or a lower side) of the outer circumference of the piston, wherein a through-hole is disposed at about the center of the

Art Unit: 3746

grooves (figure 5), a sliding surface is provided all around a skirt side of the piston.

Osborne teaches:

Contiguous groove (formed by 9,10,12; figure 2) outer shape of the grooves extending toward a **skirt side** of the **piston (6)**, and the shape of the groove includes a **first outer shape** (see above) extending toward the skirt side of the piston, a **second outer shape** parallel to the top surface of the piston, and a **third outer shape** linking the first outer shape and the second outer shape, and a curvature of the first outer shape is smaller than that of the third outer shape, the outer shape of the first groove portion is curved, all of the outer shape of the grooves (9,10,12) are shapes not forming a parallel line to the axial center of the piston when the grooves are developed in a plane

Watanabe et al teach:

The **grooves having a semicircular shape (column 3, lines 5-9; column 4, lines 6-18)**. Please note that once modified the grooves of Katayama communicate with the space in the hermetic compressor.

Please also note that since the grooves Watanabe et al are in a circular or semicircular fashion once modified the grooves will encompass (encircle) the through hole of Katayama.

Art Unit: 3746

In re claims 13 and 15 Katayama in view of Osborne further in view of Watanabe et al discloses the claimed invention since as clearly shown in the annotated drawing above the second outer shape has a length greater than a radius of the piston.

In re claim 14 Katayama in view of Osborne further in view of Watanabe et al disclose the claimed invention since as clearly shown in the annotated drawing above, once modified by Watanabe et al the first outer shape will have a semicircular configuration and therefore can be considered as being inverted relative to the second outer shape in the same fashion as applicant's invention shown in figure 3.

7. Claim 5 is rejected under 35 U.S.C 103(a) as being unpatentable over Katayama (Japanese patent publication number 2003065236) in view of Osborne (2407440) further in view of Watanabe (5076226) as applied to claim 1 further in view of Irino (5092747).

In re claim 5 Katayama as modified discloses the claimed invention but fails to teach that the compressor uses a CFC-12 type of refrigerant.

Irino in paragraph 1, lines 32-34 teaches that hydrocarbon refrigerants are widely used in refrigerant compressor. It would have been obvious to one skilled in the art at the time the invention was made to choose a CFC-12 or other hydrocarbon as refrigerant since it is one of the most commonly used refrigerant in the field.

Response to Arguments

8. Applicant's arguments with respect to claims 1-3 and 5-12 have been considered but are moot in view of new ground of rejection necessitated by amendment.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amene S. Bayou whose telephone number is 571-270-3214. The examiner can normally be reached on miff attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on 571-272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Art Unit: 3746

/Devon C Kramer/
Supervisory Patent Examiner, Art
Unit 3746

/Amene S Bayou/

Examiner, Art Unit 3746